Canadian Centre for Occupational Health and Safety

Centre canadien d'hygiène et de sécurité au travail

Rabies

A Summary of the Occupational Health Concern

P88-4E

88-02828/

RABIES

A Summary of the Occupational Health Concern

James A Baxter PhD
Canadian Centre for Occupational Health and Safety

March 1988

CCOHS/CCHST

RABIES--A SUMMARY OF THE OCCUPATIONAL HEALTH CONCERN

Each publication produced by CCOHS undergoes several stages of review. As part of this review, representatives from government, employers, and labour are requested to comment on draft copies of CCOHS documents for technical accuracy and readability.

Although every effort is made to ensure accuracy and completeness of the information, it is understood that CCOHS makes no warranty as to the accuracy or completeness of such information and assumes no liability for any damages or loss suffered as a result of any inaccuracy or incompleteness therein.

CCOHS NUMBER P88-4E
ISBN 0-660-12779-2
DSS CATALOGUE NUMBER CC273-2/88-4E

This publication is available in both official languages.

Cette publication est disponible dans les deux langues officielles.

Published 1988

---

250 Main Street East
Hamilton Ontario
L8N 1H6
416-572-2981
FAX 416-572-2206
Telex 061-8532

TABLE OF CONTENTS

	INTRODUCTION	(ii)
1.	RABIES--THE DISEASE	1
	What is rabies and what causes it?	1
	How long does it take for rabies to develop?	1
2.	RABIES--THE RISK	1
	What is the source of rabies?	1
	How common is rabies in Canada?	2
	How do rabies infections occur?	2
	What occupations have increased risk of rabies?	2
3.	RABIES--TESTS AND TREATMENT	3
	How do you recognize rabies?	3
	What laboratory tests are available for rabies?	4
	What is the treatment for rabies?	4
4.	RABIES--PREVENTION	4
	How can workers be protected from rabies?	4
	What precautions are required to control rabies?	5
	What kind of immunization is available for workers?	6
	What is recommended for workplace hygiene?	8
	FURTHER READING	9

CCOHS/CCHST

INTRODUCTION

Rabies is an infectious disease caused by a virus that affects the nervous system. The virus is most commonly spread to people by the bites of rabid animals. It can also be spread by contact with the saliva, body fluids or tissue of infected animals.

Rabies is an occupational hazard for workers who have contact with certain types of wild animals, livestock, or pets.

No treatment can save rabies victims once they develop the signs of the disease. Therefore, workers at high risk must be immunized against the disease either before they have contact with the virus or as soon as possible afterwards. If no immunization is given and the signs of the disease appear, rabies is certain to end in death.

Prevention is the only protection against this deadly disease. This requires:

- awareness of the disease,
- suitable hygiene and precautions with animals that can transmit the disease,
- proper procedures to deal with animal bites and scratches, or contact with body fluids of sick animals with unknown histories, and
- immunization when necessary.

Control of rabies in animals and people is a joint effort of agricultural, public health, veterinarian, and occupational health officials. For the program to be successful, workers at risk need to be aware of the disease and informed of proper precautions and procedures.

CCOHS/CCHST

1. RABIES--THE DISEASE

What is rabies and what causes it?

Rabies is an infectious disease that spreads from animals to humans.

It is caused by a virus that infects nerves in animals and people. The rabies virus travels to the brain through nerves inside the brain, the virus reproduces and then travels through the nerves to most parts of the body.

Eventually, the virus reaches the salivary glands where it is released into the saliva in the mouth. By this time, the disease has usually damaged the brain, sometimes producing violent behaviour. It eventually causes death.

How long does it take for rabies to develop?

In people, the incubation period (the time between initial contact with the virus and onset of the disease) generally ranges from two to eight weeks. In rare cases, it can vary from 10 days to 2 years.

The incubation period is shorter in children and in people exposed to a large dose of the rabies virus. The dose of virus depends on the size, severity and location of an animal bite or scratch.

In animals, the incubation period depends on the species of animal. For dogs it normally ranges between 14 and 60 days, but it can be much longer.

2. RABIES--THE RISK

What is the source of rabies?

The major risk of rabies comes from contact with the saliva, body fluids, or tissue of infected animals. Animals that can be infected with rabies include all mammals, but in particular:

- wild animals--mostly foxes, skunks, bats, and racoons,
- livestock--mostly cattle but occasionally horses, sheep, goats, and pigs, and
- pets--mostly cats and dogs.

In Canada, rabies is also found in wolves, coyotes and other meat-eating animals. But it is rarely found in rodents such as mice, squirrels, chipmunks, groundhogs, rabbits, rats, hamsters, or gerbils, so their bites do not usually pose a risk for rabies.

How common is rabies in Canada?

Since reporting began in 1925, 21 people have died in Canada from rabies. But rabies has become well established in Canadian wildlife, especially in Ontario. It has increased steadily in wildlife over the past 20 years.

Laboratory tests usually confirm about 2,500 cases of rabies in animals each year, but in 1986, there were over 4,500 cases. About 75 percent of cases occur in wild animals and 25 percent in livestock or pets.

Foxes and skunks account for most of the rabies in wild animals. About 500 to 800 cases are reported for each per year. Rabies in bats is found in all provinces.

In domestic animals, rabies is most commonly found in cattle, about 150 to 350 cases per year. Dogs and cats each account for about 60 to 100 cases per year. About 60 percent of human exposure to rabies occurs because of group contact with rabid dogs or cats.

Each year, about 2,500 people require rabies immunization owing to contact with animals suspected of having rabies. About 85 percent of these cases are from Ontario, and 10 per cent from Saskatchewan. No cases have been reported recently from the maritime provinces.

How do rabies infections occur?

To cause an infection, the rabies virus must enter the body and reach nerve cells.

Usually, transmission occurs when rabid animals, with the virus in their saliva, bite people. Farmers or veterinarians can become infected when they work with their hands in the mouths of rabid cows, which often appear to be choking on food.

The virus can enter the body through broken skin. It can pass through mucous membranes in the eyes, nose, mouth, or intestine.

In unusual situations, workers have contracted rabies by breathing air that carried high concentrations of the virus. This has occurred in bat caves. It has also happened in the laboratory where improper procedures produced a mist or aerosol containing the virus.

What occupations have increased risk of rabies?

Rabies is an occupational risk for people who work with wild animals, livestock, or pets.

- Exposure to wild animals--hunters, trappers, forestry personnel, wildlife biologists, forest rangers, conservation officers, taxidermists, veterinarians and their assistants, zoo personnel, and scientists working in caves.

- Exposure to livestock--farmers, farm workers, ranchers, veterinarians and their assistants, artificial insemination technicians, laboratory animal researchers and technicians, slaughterhouse workers, and meat packers and processors.

- Exposure to pets--veterinarians and their assistants, letter carriers, meter readers, delivery personnel, laboratory animal researchers and technicians, animal control officers, and hunters.

3. RABIES--TESTS AND TREATMENT

How do you recognize rabies?

Workers who may have been exposed to rabies must never wait until they develop signs of the disease. Once the signs appear, the disease is almost inevitably fatal.

It is important to recognize the signs of rabies in animals and take precautions immediately following bites, scratches, or other potentially infectious contact.

In people, rabies progresses through several stages. Initially, a person who is bitten may notice unusual feelings or tingling around the wound. Soon afterwards, there is a period of tiredness, possibly with lack of appetite, headache, fever, cough, sore throat, abdominal pain, nausea, vomiting, and diarrhea. A period of extreme worry, irritability, inability to sleep, and depression follows, possibly with hallucinations. "Furious rabies" may follow, for which the signs are strange behaviour including biting other people. At this stage, victims have an uncontrollable fear of water. This is why rabies has sometimes been called "Hydrophobia." Sometimes "paralytic rabies" develops instead of furious rabies. With this form of the disease, the muscles gradually become paralyzed, starting at the site of the bite or scratch. A coma slowly develops, and eventually death occurs.

In animals, rabies appears in two different forms. It may appear as furious rabies in which the animal changes behaviour, becomes restless, wanders aimlessly, and bites any animal, person, or object in its way. Eventually the animal becomes paralyzed in the throat and hind legs, and dies. Or it may appear as "dumb rabies" in which an animal changes behaviour, becomes withdrawn or more affectionate, tries to hide, has difficulty swallowing, and dies after a few days without ever becoming violent.

All animals do not behave in the same manner when they have rabies.

- Foxes and skunks may lose their shyness and fear of people, pets, or livestock.
- Cattle usually become restless and aggressive, bellow loudly, drool, may show gradual weakness in the hind legs, and appear to be choking.
- Cats can often become extremely vicious.
- Dogs usually become excitable, and may be vicious, wander aimlessly, and bite for no reason.

Any animal exhibiting unusual behaviour should be considered a potential rabies hazard for humans.

What laboratory tests are available for rabies?

Laboratory tests are available to detect the rabies virus as well as specific antibodies. The body produces antibodies to protect itself against the disease. Tests for rabies antibodies are occasionally ordered to determine if people have been successfully immunized against the disease.

Doctors usually do not test people to see if they have been infected with the rabies virus. Reliable test results are usually not obtained until the disease has progressed to an advanced stage. Instead, doctors generally rely on tests of suspect animals to determine if a person has been exposed to the virus.

Federal government laboratories can perform several different tests on animals. The most important test involves examining the brain for the presence of the virus or for specific changes caused by the rabies virus. Because of this, it is important to avoid damaging the brain when killing an animal suspected of having rabies.

What is the treatment for rabies?

There is no successful treatment for rabies once the disease has progressed to the point where signs appear. Only three patients in medical history have survived the disease after it progressed to this stage. Medical treatment can sometimes extend life, but the disease eventually ends in death. This is why it is so important to stop the disease from developing in people who may have been exposed to the rabies virus.

4. RABIES--PREVENTION

How can workers be protected from rabies?

All workers at potential risk of contracting rabies should be informed about the disease, its characteristics, and the nature of the risk.

Agricultural, public health, veterinarian, and occupational health officials share the responsibility to control rabies in animals and to protect people.

Vaccination programs, established to immunize dogs and cats, have been effective in reducing rabies in pets. However, rabies will continue to be a threat until the virus can be eliminated from the wild animals that spread the virus to pets and people. Research programs for this solution are in progress.

For current programs to be successful, people must continue to be well-informed, alert, and cooperative.

Some workers such as veterinarians or animal control officers have continuing risk of encountering a rabid animal. These workers should be immunized to ensure that they have protection before having contact with any animal. For other workers much less likely to encounter rabid animals, it might be sufficient to provide education on the risks, and training on protection, if they encounter an animal with rabies.

Specific recommendations depend on the individual situation. The following general recommendations apply to all workers who risk contacting rabid animals.

Preventive measures include:

- proper precautions for dealing with rabid animals and the possibility of contacting the rabies virus,
- immunization of workers either before or immediately after exposure to the virus, and
- workplace hygiene.

What precautions are required to control rabies?

Workers who have contact with animals must know how to deal with rabid animals and how to protect themselves from the rabies virus.

<u>Dealing with rabid animals</u>

Do not approach or kill an animal suspected of having rabies except to defend yourself, other people, or other animals. If an animal must be killed, try to avoid damaging its head. An undamaged brain is important for a quick laboratory diagnosis. If an animal suspected of having rabies is responsive or manageable, keep it alive and away from other animals or people. Do not touch it with bare hands. If an animal is unmanageable and dangerous and cannot be restrained or killed, observe its movements and seek help from qualified experts as soon as possible. If you must handle the animal or carcass, wear protective gloves to prevent infectious material from having contact with cuts or rashes on the skin. Also wear protective masks and goggles to protect against infectious aerosols.

According to federal regulations, all pets, livestock or wild animals suspected of being rabid, or suspected of being in contact with an animal that might have been rabid, must be reported without delay to the local district office of the Veterinary Inspections Directorate, Food Production and Inspection Branch, Agriculture Canada.

The phone number of each federal district office is listed in the telephone book under Government of Canada. In an emergency, sightings of rabid animals should be reported to local veterinarians, humane society offices, municipal animal control officials, or police.

Government veterinarians are familiar with the federal regulations concerning rabies and, if necessary, will collect and ship specimens to a federal laboratory for analysis.

Protection for workers who have had contact with the rabies virus

Workers who have come into contact with saliva, body fluids, or tissue of animals suspected of having rabies must take the following steps without delay.

Immediately clean and flush the wound to full depth with water for several minutes. This will help wash out the virus. If available, use soap or detergent to help kill the virus. Washing the wound is probably the most effective procedure in the prevention of rabies. While this is being done, shield the eyes, nose, and mouth from spray from the wound.

After cleaning the wound and removing all traces of soap, apply a household antiseptic, 70 percent alcohol, tincture or aqueous solution of iodine, or 0.1 percent quaternary ammonium compound such as benzalkonium chloride.

Remove any clothing that may be contaminated and wash it promptly. Call a doctor or emergency department of a hospital.

Contact the police, your local health unit and district veterinarian or local office of Agriculture Canada's Food and Production and Inspection Branch. If possible, provide the following information:

- The name and address of all persons attacked or exposed to the animal's saliva, body fluids or tissues
- The time and place of the incident
- Any other information to help find and identify the offending animal

Laboratory precautions for Rabies

Acceptable techniques such as those outlined in "Biosafety in Microbiological and Biomedical Laboratories" by J.H. Richardson and W.E. Barkley, or "Safety precautions in handling rabies" by M.M. Kaplan, should be used in research or diagnostic laboratories that deal with animals or patients suspected of having rabies.

What kind of immunization is available for workers?

There are two types of immunization:

People who require immunization before exposure to the virus need three doses of the rabies vaccine, one dose each on days 0, 7, and 21. People who require immunization after contact with the virus need five doses. The first should be given as soon as possible and the rest on days 3, 7, 14, and 28. The new rabies vaccine, available since 1980, provides protection starting 7-10 days after injection and lasting for over a year. The vaccine sometimes causes local reactions at the injection site, but rarely severe reactions.

The rabies immune globulin which contains antibodies that neutralize the virus provides rapid protection but lasts for only a few weeks. It is given in one dose directly into the wound as soon as possible after contact. Such wounds should not be sutured.

Immunizing before contact

In Canada, the National Advisory Committee on Immunization recommends that pre-exposure rabies vaccination should be offered as a choice to workers at possible high risk of contacting rabid animals. These workers include veterinarians, animal handlers, certain laboratory workers dealing with rabies, workers who have contact with bats or bat caves, forest rangers, conservation officers, wildlife biologists, and certain travellers at high risk.

Workers with continuing high risk should have their blood tested every two years to determine if booster injections are required. Laboratory workers who could have accidental contact with the rabies virus without knowing it should be tested every six months. Those with inadequate levels of antibodies should be given a booster dose of vaccine.

Immunizing after contact

People who have had contact with the rabies virus require both the rabies immune globulin and the rabies vaccine as soon as possible.

Only a single dose of rabies immune globulin is necessary. In previously vaccinated people, only two doses of the vaccine are required after a biting incident, one immediately and another three days later.

Immunization may be considered after contact in the following situations:

- the animal appeared to have rabies,
- the animal may possibly have had rabies,
- the animal was wild, from a region where rabies is known to be a problem, or
- the animal was a dog or cat that escaped after the contact without being tested.

Immunization is usually recommended if the animal makes contact by biting, or if the animal's saliva, body fluid or tissue makes contact with a rash, scratch, open wound, eyes, nose, or mouth.

Wild animals or unwanted dogs or cats suspected of having rabies are humanely killed without delay. Their heads are submitted for laboratory examination. Vaccination may be discontinued if tests of animals killed at the time of attack are negative.

Medical professionals generally do not recommend immunization if the animal had no contact with a person's skin or mucous membranes. Nor is immunization recommended if workers have had only casual contact with the animal such as petting, with no possible contamination of broken skin or mucous membranes.

Healthy dogs or cats involved in biting incidents are held in confinement for at least 10-14 days, according to provincial regulations. If rabies does not develop in that time, no immunization is required for the injured worker. If signs of rabies do develop, Agriculture Canada is notified, the animal is humanely killed and analyzed, and immunization is started without delay.

What is recommended for workplace hygiene?

Develop procedures to prevent contact with the rabies virus within the workplace. Where appropriate, have workplace procedures posted for disinfecting or sterilizing areas that may be contaminated with the rabies virus.

Quarantine all wild animals prior to introducing them into an animal research program. Avoid the use of "pound source" animals in research.

Use caution if handling animals killed by the roadside since they may have had rabies.

Wear protective face masks, gloves, clothes, and shoes when handling anything from an animal suspected to have rabies or when cleaning areas where suspected rabid animals are confined.

The rabies virus does not survive long outside of animals. It is generally destroyed by heat, sunlight, or air. Detergent, ethyl alcohol, or a one-in-ten dilution of household bleach can also destroy the rabies virus.

Routinely disinfect working surfaces, tools and instruments, floors and walls that may have been contaminated with fluids from animals, using procedures established for infection control.

Use ultraviolet light for disinfecting areas such as laboratories where the rabies virus may become airborne. These lamps must only be used during nights or weekends when no workers are in the workplace.

Package infected waste in puncture-proof, leak-proof containers. Clearly label and sterilize them before disposal according to procedures developed for biological hazards.

CCOHS/CCHST

FURTHER READING

Benenson, A.S. Control of communicable diseases of man. 14th ed. Washington, D.C. : American Public Health Association, 1985

Christie, A.B. Rabies. Journal of Infection. Vol. 3, no. 3 (1981). p. 202-218

Driggers, D.A.; Swedberg, J.; Johnson, R. Immunization update. American Family Physician. Vol. 27, no. 2 (Feb. 27, 1983). p. 249-253

Gamet, A. Rabies. In: Parmeggiani, L., ed. Encyclopaedia of occupational health and safety. 3rd ed. Geneva : International Labour Office, 1983. p. 1829-1830

Johnston, D.H.; Voigt, D.R. Baiting system for the oral rabies vaccination of wild foxes and skunks. Comparative Immunology, Microbiology and Infectious Diseases. Vol. 5, no. 1-3 (1982). p. 185-186

Kaplan, M.M. Safety precautions in handling rabies virus. In : Kaplan, M.M.; Koprowski, A. Laboratory techniques in rabies. (Monographs series/World Health Organization; no. 23) Geneva : World Health Organization, 1973

Kauffman, F.H.; Goldman, B.J. Rabies. American Journal of Emergency Medicine. Vol. 4, no. 8 (Nov 1986). p. 525-530

Morrison, A.J.; Wenzel, R.P. Rabies : a review and current approach for the clinician. Southern Medical Journal. Vol. 78, no. 10 (Oct. 1985). p. 1211-1218

Pacer, R.E.; Fishbein, D.B.; Baer, G.M.; Jenkins, S.R.; Smith, J.S. Rabies in the United States and Canada, 1983. Morbidity and Mortality Weekly Report : MMWR. Vol. 34, no. 1, suppl. (1985). p. 11-27

Rest, J.G.; Goldstein, E.J.C. Management of human and animal bite wounds. Emergency Medicine Clinics of North America. Vol. 3, no. 1 (Feb. 1985). p. 117-126

Richardson, J.H.; Barkley, W.E. Biosafety in microbiological and biomedical laboratories. Washington : U.S. Department of Health and Human Services, 1984

Steele, J.H.; Beran, G.W.; eds. Handbook series in zoonoses. Vol. 2. Florida : CRC Press Inc., 1982

Tabel, H.; Corner, A.H.; Webster, W.A.; Casey, C.A. History and epizootiology of rabies in Canada. Canadian Veterinary Journal. Vol. 15, no. 10 (Oct. 1974). p. 271-281

Varughese, P.V. Rabies in Canada in 1985. Canadian Medical Association Journal = Journal de l'Association médicale canadienne. Vol. 136, no. 12 (June 1987). p. 1277-1280

CCOHS/CCHST